

CLAIMS

I claim:

- 5 1. A method of obtaining balanced phase shift operation, comprising
- A) employing a resonator supporting nonreciprocal wave propagation which can be
 divided in two parts showing symmetry and is loaded with electronically active
 material or materials,
- 10 B) applying electronic means to bias said resonator with respect to said
 electronically active material or materials in a manner counter-reacting each
 other for said two parts of said resonator causing insignificant change in the
 overall resonance condition,
- wherein said electronic means induce effectively shift in the coupling positions of
 feeders in reference to said resonator in the electrical sense, resulting in phase shift of
15 the transmitted signal or waveform from said resonator whose amplitude depends
 insignificantly on the derived angle in said phase shift thereby realizing said balanced
 phase shift operation.
2. A balanced phase shifter device, comprising
- 20 A) a resonator supporting nonreciprocal wave propagation which can be divided in
 two parts showing symmetry and is loaded with electronically active material or
 materials,
- B) electronic means to bias said resonator with respect to said electronically active
 material or materials in a manner counter-reacting each other for said two parts
25 of said resonator causing insignificant change in the overall resonance condition,
 wherein, said electronic means induce effectively shift in the coupling positions of
 feeders in reference to said resonator in the electrical sense, resulting in phase shift of
 the transmitted signal or waveform from said resonator whose amplitude depends
 insignificantly on the derived angle in said phase shift thereby realizing the balanced
30 phase shift operation.

3. The balanced phase shifter device of Claim 2 wherein said electronically active material or materials include cubic/hexagonal ferrite or ferrites, ferroelectrics, semiconductor junctions such as diodes or transistors, or in combination,
- 5 4. The balanced phase shifter device of Claim 2 wherein said electronic means include the application of bias voltages, bias currents, bias electric fields, and/or bias magnetic field or fields.
- 10 5. The balanced phase shifter device of Claim 2 wherein said resonator assumes the geometry of microstrip, stripline, coplanar waveguide, slotline, finline, image line, waveguide, coax line, parallel wire, or in combination, including coupled transmission lines.
- 15 6. The balanced phase shifter device of Claim 2 wherein said feeders couple to said resonator via the mechanism of conductive coupling, inductive coupling, capacitive coupling, or in combination.
- 20 7. The balanced phase shifter device of Claim 2 wherein said resonator assumes the shape of a disk or a ring not necessarily to show the circular symmetry.
- 25 8. The balanced phase shifter device of Claim 2 wherein said nonreciprocal wave propagation results from said electronically active material or materials, the corporate in-phase feeding configuration adopted by said feeders, or in combination.

SEQUENCE LISTING

(Not Applicable)